FS Poseidon, Cruise 539 06.11.2019 - 22.11.2019

Varna (BG) - Varna (BG)

2. Wochenbericht (11. 11. 2019 – 17. 11. 2019)

In the second week of our cruise we finished the water column transect and moved onto the sediment transect back towards the shore. We are very happy with our sampling progress so far and the mood onboard is great. We are making good time along our cruise track and our fridges and freezers are filling with precious samples.

On Monday we started with sediment sampling, deploying the multicorer and the gravity corer. The sediments in the Black Sea are notoriously difficult to sample due to their softness and we indeed encountered problems with the multicorer. However, we managed to successfully deploy the gravity corer and collected ca. 4-5 m long sediment cores on several stations.

Fig. 1. A piece of the recovered gravity core showing a layer of limnic sediments.

The Black Sea used to be a freshwater lake until ca. 9.4 kyr ago when the Mediterranean water flowed into the Black Sea through the Bosporus. Correspondingly, the sediment in the cores changes color and composition as it transitions from the present day laminated sediments through the sapropel towards limnic sediments. Upon bringing the gravity corer on deck, our Marum colleagues section the core into 1 m long pieces and carefully seal these in gas-tight bags under nitrogen atmosphere. The cores are then placed into a refrigerated container where they stay until their transport to Bremen. In Bremen, the cores will be archived into the Core Repository and be available to scientists that wish to study them.

We continued our water column work also throughout the second week. The hydrographic and geochemical profiling showed at all stations a stratified water column with highest chlorophyll concentrations in surface waters. Below ca. 100 – 120 m depth the oxygen disappeared, leaving in most cases more than 1500 m of anoxic water below. The anoxic waters contained high concentrations of sulfide, which is produced in ample amounts as a result of bacterial sulfate reduction. Presumably due to this not particularly friendly environment we only saw scarce signs of higher marine life – on two of our station we were accompanied by a small group of dolphins that played and raced along the ship. Other than that, we only see jellyfish swimming around.

As with previous stations, also on this transect we deployed in situ pumps to collect particulate material from the different depths of the Black Sea water column. Additionally,

we again deployed the pump CTD to collect water for incubations. The pumpCTD allows us to record a continuous high-resolution depth profile of nutrients, such as nitrate and ammonium, and other chemical constituents. The pumpCTD is also particularly suited for sampling of anoxic waters as it leads to significantly lower oxygen contamination of the sampled water. That is particularly important for our stable isotope incubations from which rates of oxygen-sensitive microbial processes are determined. The pumpCTD is also used to collect large water volumes that are filtered onto filters for later extraction of DNA and RNA. These samples will be used for molecular analyses that will determine the composition of microbial communities at the various investigated depths.

Fig. 2. Preparing the pumpCTD for deployment

On Wednesday and Thursday we encountered wind and waves of 2.5 meters which prevented us from deploying heavy geological equipment; nonetheless we continued with the water column sampling programme. The weather improved on Friday, just on time for our Bergfest celebration which we enjoyed on a sunny day of 17 degrees.

On the weekend we visited a station which is particularly interesting for sediment (paleo)geochemistry. The station lies north of our slope transect and is influenced by the discharge of the three large rivers that drain into the northwestern part of the Black Sea – the Danube, the Dnieper and the Dniester. The rivers deposit terrestrial material collected along their way and the analyses of these sediments thus allows for the reconstruction of past vegetation and thus climate.

For the next week we are looking forward to our last two stations and we are optimistic about finishing our scheduled program on time as the weather forecast looks promising for the next few days.

With best wishes from 43°38’ N, 30°35’ E,

Jana Milucka and the Participants of POS539